SUBSTITUTED ENGLISH TRANSLATION OF THE APPLICATION

FLUID SPINNING SYSTEM

PURPOSE OF THE INVENTION

The present invention is related to a new spinning system within a fluid medium that transforms the fibres into yarns by utilizing a fluid medium in which the fibres are inserted, moved and transformed into yarn(spinning) by means of the control and variation of determined parameters of the fluid system and the movement control of the fibres to spin, and at the same time they can obtain a physical and chemical treatment in said fluid medium from the recognized in the textile sector, simultaneously with the spinning being carried out.

BACKGROUND

Several systems using fibres exist: The conventional spinning system or ring spinning, open end spinning, friction or Dref spinning, etc. None of these systems uses a fluid medium to transform the fibres into yarn , and the majority utilizes mechanical systems of spinning.

DESCRIPTION OF THE INVENTION

The present invention consists of a system or machine which produces and treats yarn from fibres through the establishment, variation, and control of static and dynamic parameters of the fluid in which the fibres have been introduced, that at the same time causes physical overlaying effects, the drawing out, twisting in the fibres themselves.

The system essentially has a set of fluid pipes in which said fluid circulates in a closed system under pressure, in the interior of which exists one or several intakes through which the fibres in the fluid system are intro-

duced, dragged by a fluid; there also exists one or several outlets for the yarn in the fluid circuit.
This circuit has some fluid driving mechanism, e.g. pumps, in such a way that one can modify all of the variables that affect the speed, the flow rate, the pressure, etc. and the intakes have the possibility to change the surface of the clearance which can also be done in other points of the circuit, as well as the predetermined modification of the direction of the fluid stream to cause the desired movements of the textile fibres.

The spinning process is produced when the fibres are introduced, dragged by a fluid medium, through one or several orifices or nozzles that are perpendicular or oblique with respect to the pipe axis, within the closed circuit of fluid under pressure, from the moment in which they are carried out, in a combined and programmed form according to the type of yarn to be obtained: parallel connections of different orifices or intake nozzles through which fluid under pressure is admitted(with or without fibres), reduction effects, Venturi effects in the interior of the pipes, connection between different pipes to achieve the overlay or doubling of different fibres , and any other effect known in the state of the art which might be susceptible to being carried out by conventional means in the interior of a fluid which contains some solids(fibres) in suspension. Among these effects, the following are included: dyeing, steaming, fixing or any other possible treatments of fibres and/or yarns.

By making a comparison with conventional spinning, we can say that fibre introduced in the fluid medium are doubled or overlay when the two intake nozzles of fluid and fibres

are connected in parallel, or two pipes converge at a point, and each time a Venturi effect is used (increasing of speed in the medium as a cause of the diminishing of the clearance)a drawing(stretching) of the fibres is carried out. This is necessary in order to synchronize or organize the fibres and place them one respect to another as parallel as possible. With the Venturi effect we obtain the effect of reduction of the mass of fibres which circulates within the medium in such a way that the tautness(thickness) of the yarn will depend on the quantity of fibres in grams for each lineal unit of the section of said yarn (tautness of the yarn).

Also within the circuit whose pipes might have different geometric forms, among them, preferably the tubular one, several auxiliary devices can be arranged that might help to parallelize the fibres in the interior of the fluid. These devices can be for example,ripplings(card clothings), that provide mechanical help within the fluid to parallelize the fibres, fins, deflecting blades, nozzles for the introduction of air under pressure and other fixed or movable elements which permit to modify the direction of the fluid at will.

The twisting of the yarn is carried out through the application divers effects which can be combined or not among themselves and can be applied simultaneously or in deferred phases. The distinct effect and degrees of twisting is achieved through the application of conventional techniques very well recognized in the technical standard of fluids dynamics, through whose controlled utilization the fluid path diverges, and consequently that of the circulating fibres. A circular movement of the yarn around it-

self is generated by causing the creation of a Coriolis effect, or any change of direction is carried out in any of the three spatial directions (e.g. 180 degrees of deviation, multiple changes of spiral direction,etc.) all that for applying a controlled twisting motion to the yarn, the above mentioned can be combined with individual changes of the clearance to internally cause Venturi effects, and with the injection of more fibres in determined points.

The twisting of fibres is produced when the fibres interlace among each other, once they have been attached as parallel as possible to one another. As we mentioned before, that can be achieved through the manipulation of solids and/or through the insertion of new fibres through additional nozzles (with ability of Venturi effects or not), in such a way that the fibres remain interlaced and twisted. Once the effect within the system is achieved, the already doubled and/or stretched and/or twisted yarn is collected by a folding system which might be a conventional spindle or another folding system that already exists in the market.

The type of fluid medium might be any of the ones used in the industrial practice.

Other desired additional transformations of the yarn can be achieved through the utilization of selected fluids for such ends, or through the addition to the fluid system of different fluids. Among them we shall cite all those that implicate modifications in the physical and chemical structure of the fibres and of the resulting yarn. Examples for these transformations might be the dyeing of the

yarn, the steaming, the fixing, the bonding or treatment with liquids in order to improve the physical and chemical characteristics of the yarn, superficial treatments or other, to only cite some of all that can be carried out by the textile industry using a fluid medium. The pressure, and the temperature of the fluid used can be diverse in function of what characteristics of the final yarn to be produced are desired.

All possible effects that exist in the recognized textile practice that can be applied to a yarn can also be reproduced in the fluid system of the actual invention through the modification of the static and dynamic variables of the fluid system as mentioned before. For example, one can make a slubby yarn by carrying out some stretchings(Venturi effects or combination of the above described) in programmed manner within the fluid medium. Other effects might be loops, saw pattern, knots, Lycra insertion,etc.

The dimensions of the pipe or pipes used for configuring the circuit may be of any kind, and the driving pumps and injection as well as the control elements (pressure gauges,etc.) programming of the operations can form, together with the required injectors, subsystems that achieve the results in laminated or turbulent form in the interior of the pipe.

DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, among the several practical applications that the invention facilitates, based on drawings that are shown in

Fig.1 a scheme showing the causing of the Venturi Effect in a tubular line

Fig.2 a scheme showing the creation of torsion of some Fibers to obtain twisted yarn.

Fig.3 A scheme of a fluid system of the invention with three intake nozzles for fibres and an outlet for yarn.

Fig.4 schematic view of the fluid injection area, with or without fibres

PREFERRED EMBODIMENT OF THE INVENTION

A preferred embodiment of the invention among the multiple practical applications the invention facilitates, will be shown, based mainly on the system scheme shown in fig.3, as follows.

The fluid together with the textile fibres it transports is introduced into a pipe assembly through the nozzles I1,I2,I3 .

The injected fluid in I1 undergoes a Venturi effect in E1, when it enters the circuit C1, which causes a stretching of the transported fibres, whereas the fluid with the fibres goes on with it's trajectory until point 1, wherein the fluid with stretched fibers coming from 11 merges with stream coming from I2. The fluid in this circuit C1 is driven by the pump B1.

The injected fluid in I2 undergoes a Venturi effect in E2, when it enters in the circuit C2, which causes a stretching of the transported fibers, wherein the fluid with the fiber continues with its trajectory until it reaches point 1 wherein it merges with this stream of fluid with stretched fibers coming from I1 and I2 causing the folding or doubling of the fibers coming from 11 and 12. In said point 1, the reduction of the section of the pipe coming from I2 causes, due to the Venturi effect, an additional stretch of the already stretched and folded fibres coming from I1 and I2; then the fluid stream with said stretched and bent fibers goes into the lower horizontal area of the pipe which comes from I2 in a way that is out of alignment with respect to the axis of said pipe thereby causing a vortex effect of the fluid and then again causes a pre-torsion of the fibers at that point. The fibers transported by the fluid reach point 2 in this circuit C2 is driven by pump B2.

The injected fluid in I3 undergoes a Venturi effect in E3 when it enters in the circuit C3, which causes a stretching of the transported fibers. The fibers continue their run towards point 2 where the fluid with the folded/stretched/pre-twisted fibers coming from I2 joins the steam which comes out of I2 joins the stream again causing a folding or doubling of the fibers which also causes a reduction of the pipe's section coming from 2 and I3 causing due to the Venturi effect, an additional stretching of the fibers coming from I2 and I3; Then, the fluid stream with said fibers joins the lower horizontal zone of the pipe coming from I3 in an off-centered way with respect to the axis of said conduction thereby causing a

vortex effect of the fluid which in turn causes a pretorsion of the fibers at that point. The fibers transported by the fluid reach point 3 where a rotation of the fluid is caused by the Coriolis which in turn causes a twisting of the fibers, which already have taken the form of a stretched and twisted yarn, which can be extracted from the pipe through the outlet to be later wound up or collected in any other conventional form. Th fluid in this circuit 3 is driven by the pump B3.

The described preferred embodiment has been carried out only as an example. The fluid spinning system of the invention may show different configurations of circuits, different sizes and very diverse combinations of intake nozzles, stretching zones caused by the Venturi effect, doubling and twisting areas for fibers and yarn in function of the kind of material and sizes of the yarn to be produced, while the described embodiment does not involve any limiting condition of its scope.